

DEVELOPMENT OF CIDER FROM SUGAR PALM (*Arenga pinnata*) SAP

THESIS

GUIAMARIE CAZANDRA B. VALDEZ

College of Agriculture, Forestry, Environment
and Natural Resources

CAVITE STATE UNIVERSITY

Indang, Cavite

Cavite State University (Main Library)



T5833

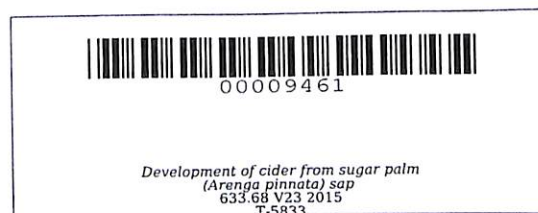
THESIS/SP 633.68 V23 2015T

April 2015

DEVELOPMENT OF CIDER FROM SUGAR PALM (*Arenga pinnata*) SAP

Undergraduate Thesis
Submitted to the Faculty of the
College of Agriculture, Forestry, Environment, and Natural Resources
Cavite State University
Indang, Cavite

In partial fulfilment
of the requirements for the degree
Bachelor of Science in Food Technology



GUIAMARIE CAZANDRA B. VALDEZ
April 2015

ABSTRACT

VALDEZ, GUIAMARIE CAZANDRA B **Development of Cider from Sugar Palm Sap.** Undergraduate Thesis. Bachelor of Science in Food Technology. Cavite State University, Indang, Cavite. March 2015. Adviser: Mrs. Aitee Janelle E. Reterta.

A study was conducted to develop cider from sugar palm sap. Specifically, this study aimed to describe a process in producing sugar palm cider from sugar palm sap; identify the fermentation requirement for sugar palm cider; determine physico-chemical properties of the product; evaluate sensory properties of sugar palm sap for sugar palm cider, and determine the consumer acceptability of sugar palm cider.

Approximately 15 L of freshly harvested sugar palm sap were gathered and fermented in 9 glass bottles at 25°C, 15°C, and 5°C. Total soluble solid, pH, and alcohol content of the sap were monitored every 20 hr until the desired standard properties of cider were achieved. pH range 3.2 – 4, total soluble solids of 12.5 – 15°Brix and a specific gravity of 1.050 – 1.070 or a 6.2 – 8.5 percent alcohol content.

After 20 hr, treatment 1 sugar palm sap with an initial 16.2°Brix was converted into cider having a total soluble solid of 14.5°Brix, pH of 4.00, and 6.64 percent alcohol. The cider was described by ten laboratory panellists and consumers as moderately acceptable.

ABSTRACT

VALDEZ, GUIAMARIE CAZANDRA B **Development of Cider from Sugar Palm Sap.** Undergraduate Thesis. Bachelor of Science in Food Technology. Cavite State University, Indang, Cavite. March 2015. Adviser: Mrs. Aitee Janelle E. Reterta.

A study was conducted to develop cider from sugar palm sap. Specifically, this study aimed to describe a process in producing sugar palm cider from sugar palm sap; identify the fermentation requirement for sugar palm cider; determine physico-chemical properties of the product; evaluate sensory properties of sugar palm sap for sugar palm cider, and determine the consumer acceptability of sugar palm cider.

Approximately 15 L of freshly harvested sugar palm sap were gathered and fermented in 9 glass bottles at 25°C, 15°C, and 5°C. Total soluble solid, pH, and alcohol content of the sap were monitored every 20 hr until the desired standard properties of cider were achieved. pH range 3.2 – 4, total soluble solids of 12.5 – 15°Brix and a specific gravity of 1.050 – 1.070 or a 6.2 – 8.5 percent alcohol content.

After 20 hr, treatment 1 sugar palm sap with an initial 16.2°Brix was converted into cider having a total soluble solid of 14.5°Brix, pH of 4.00, and 6.64 percent alcohol. The cider was described by ten laboratory panellists and consumers as moderately acceptable.

TABLE OF CONTENTS

	Page
BIOGRAPHICAL DATA	iii
ACKNOWLEDGEMENT	iv
ABSTRACT	vi
LIST OF TABLES	x
LIST OF FIGURES	xi
LIST OF APPENDICES	xii
LIST OF APPENDIX TABLES	xiii
LIST OF APPENDIX FIGURES	xiv
INTRODUCTION	1
Statement of the Problem	2
Objectives of the Study	2
Importance of the Study	3
Scope and Limitation of the Study	3
Time and Place of the Study	3
REVIEW OF RELATED LITERATURE	4
Sugar Palm	4
Sugar Palm Sap	4
Properties of Palm Sap	5
Cider	6
Cider Processing	7

METHODOLOGY	9
Experimental Design	9
Preparation Materials	9
Fermentation	10
Physico-chemical Evaluation of Sugar Palm Sap After Fermentation in each Treatments	11
Total soluble solid (°Brix)	11
pH	11
Alcohol content	12
Harvesting of Cider	12
Filtering of Cider	12
Bottling of Cider	13
Pasteurization	13
Storing of Cider	13
Sensory Evaluation	13
Consumer Acceptability	15
Statistical Analysis	15
RESULTS AND DISUCSSION	16
Chemical Evaluation of Sugar Palm Sap during Fermentation	16
Total soluble solid	16
pH	17
Alcohol content	17
Specific gravity	18

Sensory Properties of Sugar Palm Cider	18
Color	19
Clarity	19
Aroma	19
Sourness	19
Sweetness	19
Flavor	19
Off-flavor	21
Alcoholic Taste	21
General Acceptability	21
Processing Specification for Sugar Palm Cider	21
Consumer Acceptability	23
SUMMARY, CONCLUSION, AND RECOMMENDATION	26
Summary.....	26
Conclusion	27
Recommendation	28
REFERENCES	29
APPENDICES	31

LIST OF TABLES

Table		Page
1	Conversion table of specific gravity to °brix and potential alcohol content	14
2	Chemical properties of sugar palm cider produced by different fermentation conditions	17
3	Mean sensory scores for quality attributes of sugar palm cider	20
4	Process flow and specifications for sugar palm cider	22
5	Consumer acceptability of sugar palm cider	24

LIST OF FIGURES

Figure		Page
1	Fermentation set-up for sugar palm cider production	11
2	Acceptability ratings for sugar palm cider	25

LIST OF APPENDICES

Appendix		Page
1	Score sheet for sensory evaluation of sugar palm cider	32
2	Score sheet for consumer acceptability test	33

LIST OF APPENDIX TABLES

Table		Page
1	Production cost of sugar palm cider	35
2	Master sheet	36
3	Analysis of variance for total soluble solids (°Brix) ...	37
4	Analysis of variance for pH	38
5	Analysis of variance for alcohol content	39
6	Analysis of variance for specific gravity	40
7	Friedman analysis for color	41
8	Friedman analysis for clarity	42
9	Friedman analysis for aroma	43
10	Friedman analysis for sourness	44
11	Friedman analysis for sweetness	45
12	Friedman analysis for flavor	46
13	Friedman analysis for off-flavor	47
14	Friedman analysis for alcoholic taste.....	48
15	Friedman analysis for general acceptability	49

Appendix Figure		Page
1	Measuring sap using glass cylinder.....	51
2	Pouring sugar palm sap to glass fermentation bottles	52
3	Harvesting of sugar palm cider	53
4	Alcohol determination of sap using hydrometer	54
5	Sugar palm cider treatment's 1,2, and 3	55
6	Sugar palm cider treatment's 4,5, and 6	56
7	Sensory evaluation of sugar palm cider	57
8	Consumer acceptability evaluation	58

DEVELOPMENT OF CIDER FROM SUGAR PALM SAP

Guiamarie Cazandra B. Valdez

Undergraduate thesis submitted to the faculty of the Institute of Food Science and Technology, College of Agriculture, Forestry, Environment, and Natural Resources, Cavite State University, Indang, Cavite in partial fulfilment of the requirements for the degree of Bachelor of Science in Food Technology with Contribution No. FT 2014-15-16
Prepared under the supervision of Mrs. Aitee Janelle E. Reterta.

INTRODUCTION

Cider is a low-alcohol beverage, originally made with apple juice (Johansen, 2000). Cider is a good source of potassium, for growth and prevention of brittle teeth. Cider is also rich in acetic acid which lowers the blood's pH level and rich in malic acid which can fight infections caused by harmful bacteria and fungus (Dees, 2000).

Cider production requires enough sugar as substrate which can be provided by sugar palm sap. With the process of fermentation, a good combination of sweet and sour tastes can be developed to produce cider.

Sugar palm sap makes a good raw material for cider because it has high sugar content. The sugar could be converted into alcohol. Fermentation can be manipulated to provide acceptable sweetness and alcoholic flavour characteristic of cider (Johansen, 2000).

The properties of cider in terms of color can range from cloudy with sediment to completely clear. Their colour is moderately white. Some cider can be colourless, called